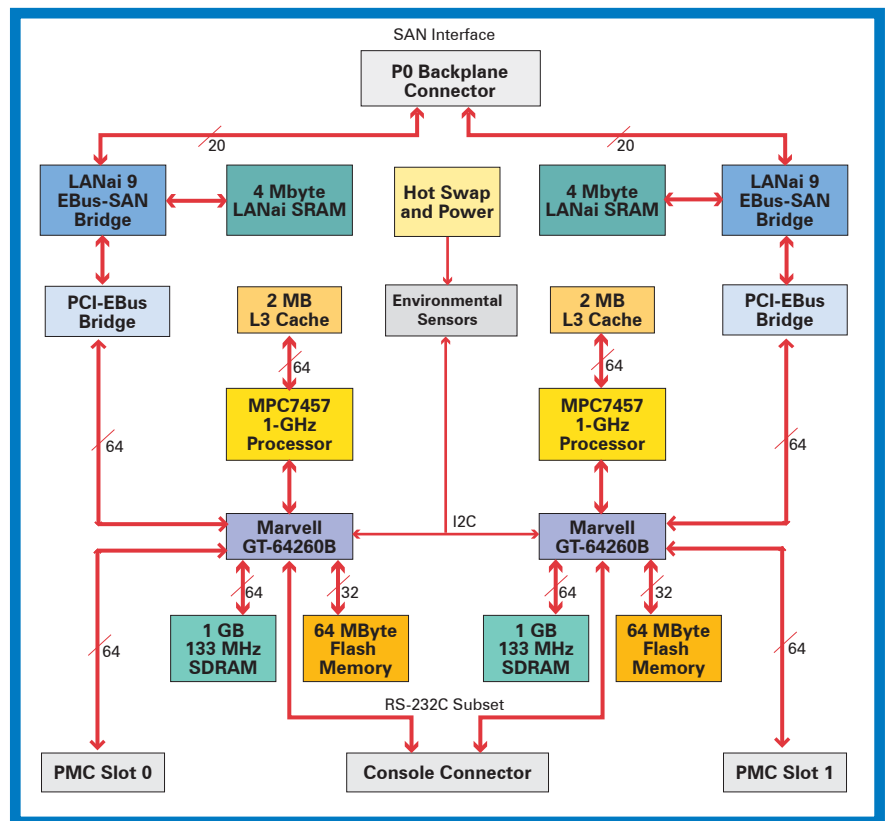


# StarGate 2924R

Combining rugged features with high performance computing and I/O streaming capability on a single VME 6U board, the Level III *StarGate 2924R* delivers the computational power of the Motorola PowerPC 7457 with AltiVec™ operating at 1 GHz. The *StarGate* architecture implements two independent processing nodes. Each processing node supports two fast PCI buses (64 bit/64 MHz) enabling concurrent I/O and data processing to the SDRAM memory. One PCI bus is reserved to handle Myrinet™ data transfers, at the full duplex speed of 250 MB/s in each direction, from the LANai network processor to the VME P0 connector on the backplane. The other PCI bus supports a single PMC slot for high speed data streaming operations.

The *StarGate 2924R* was designed with a thermal/stiffener rib to increase structural integrity to meet MIL-STD-810F for shock and vibration. When utilized as a companion product installed in the CSPI FastCluster 220R rugged chassis, the *StarGate 2924R* also meets the requirements of MIL-STD-461D for EMC/EMI and MIL-STD-704A for aircraft power. The *StarGate 2924R* is an ideal choice for use in the harsh and confined environments of shipboard, airborne and land-mobile platforms.



**Level III Rugged Air-cooled 6U Board with Stiffener designed to meet MIL-STD-810F for shock & vibration**

Agency Certifiable product also designed to meet UL, CSA, TUV, CE & FCC Class B, part 15 Regulatory Standards

Dual PowerPC per 6U Slot

PowerPC 7457 with AltiVec @ 1 GHz  
1K Complex FFT 11 Microseconds  
L2 Cache @ 1 GHz (512 KB)  
L3 Cache @ 333 MHz Data Rate (2 MB)  
1 GB 133 MHz SDRAM per node

Two PMC Slots 64-Bit/66 MHz

Myrinet On VME (ANSI/VITA 26-1998)

Linux & VxWorks/Tornado Development Environment

Fast Boot & Live Insertion

Power On Self Test

6U VME64 Extension ANSI/VITA 1.1-1997)

Front Panel LEDs monitor power and hot swap circuitry & the Myrinet SAN interface

**CSPI**

MultiComputer Division

# StarGate Specifications

## StarGate

## 2924R

### PCI Industry Standard Interface

PCI Bus	64-bit Wide @ 66 MHz
PCI Bus Bandwidth	528 MB/sec
PMC Expansion Slots	Dual IEEE P1386.1 Compliant 32/64-bit

### Front Panel I/O Connectors

Serial Console

### VME Bus

Power Only

### COMPUTE PROCESSOR

#### Processor

# of Processor Elements/Nodes	2/2
1K Complex FFT	11 Microseconds per processor
Processing Model	Message Passing Between Nodes
Processor Model	MPC7457 W/AltiVec™
Internal Processor Clock	1 GHz
System Clock	133 MHz

#### L1 Cache

32 KB Instruction/32 KB Data

#### L2 Cache

on-chip 512 KB @ 1 GHz

#### L3 Cache

2 MB (64-bit @ 333 MHz)

#### SDRAM (ECC)

Memory Size	1 GB per node / 2 GB per board
Data Transfer Rate	64 bits @ 133 MHz

#### FLASH

Memory Size	up to 64 MB per processor
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### NETWORK COMMUNICATIONS

#### Network Standard

Myrinet on VME (ANSI/VITA 26-1998)

#### Network Interface Controller

NIC Model	Myrinet LANai9
RISC Memory	2 @ 4 MB SRAM (64 bit)
RISC Clock Rate	132 MHz, Processor @ 264 MIPS
Myrinet on P0	2 SAN Ports, 500 MB/s per port (250 MB/s in, 250 MB/s out)

### ELECTRICAL/MECHANICAL

#### Electrical Power

5.0 Volts	20.1 Watts typical
3.0 Volts	19.0 Watts typical

#### Packaging Standard

6U VME64 Extension (ANSI/VITA 1.1-1997)

#### PMC Expansion Connector

3.3 Volt Signaling @ 33/66 MHz

#### Board Size

Height x Depth x Width	233.4 mm (9.2 in) x 160.0 mm (6.3 in) x 19.8 mm (0.8 in)
Weight	1.17 lbs.

#### Ruggedization

Air-cooled Level III

## Choice of Operating System Software

The **StarGate 2924R with VxWorks** provides a total system software solution so users may quickly develop and run complex real-time applications. The foundation for this software is the industry standard **VxWorks™** Real-Time Operating System (RTOS). This efficient RTOS incorporates such features as a scalable run-time kernel to conserve code space and support for many different Application Programming Interfaces (API's). Integrated communication routines support data transmission over the Myrinet fabric. TCP/IP is supported throughout the Myrinet network. This protocol permits standard services across heterogeneous processors.

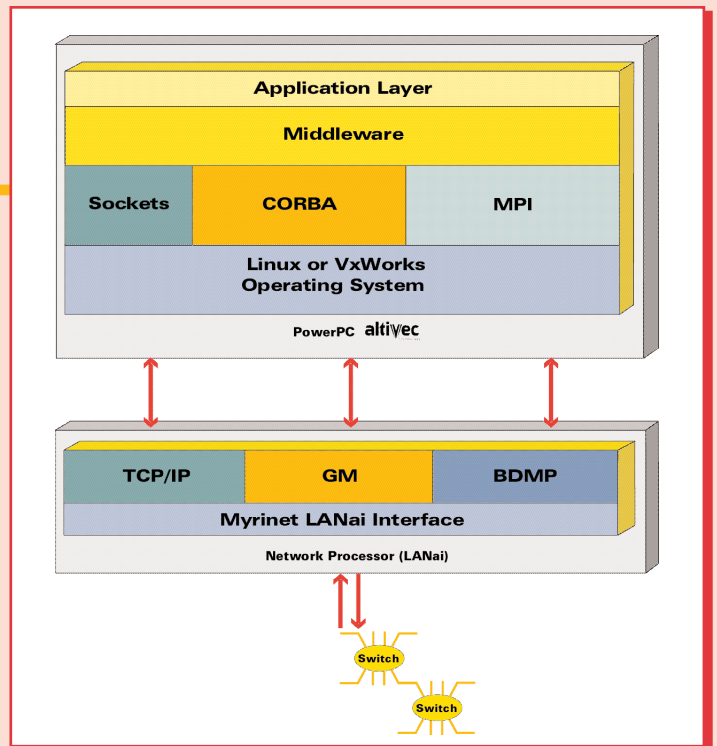
The **StarGate 2924R with Linux** provides an open source UNIX like operating system environment with a POSIX implementation including true multitasking, virtual memory, shared libraries, demand loading, work load balancing, and support for TCP/IP networking. The Linux operating system is easily integrated with clustering software such as MPI and includes a full suite of GNU compiler tools to facilitate development.

## MPI Development Environment

Message Passing Interface (MPI) is a standard for multicomputer and cluster message passing. The MPI parallel programming library provides multiprocessor control. The MPI library offers an easy way for the programmer to associate specific data with specific processes. The MPI library facilitates the creation of dynamically scalable applications. An application may be written for a few processing nodes for simplicity, and then easily expanded to invoke additional nodes for faster execution.

## ISSPL & VSIPL Lite Signal Processing Libraries

The **Industry Standard Signal Processing Library (ISSPL-ALT)** is a library of approximately 250 functions for signal and image processing applications that is highly optimized for use on the Altivec. Compute-intensive functions are hand-coded to speed up execution time. The remainder of the functions use C compiled code optimized for speed. The ISSPL-ALT reduces programming complexity by providing a single calling function for complex mathematical and signal processing routines. Both development and execution times are significantly improved. The ISSPL-ALT provides a full complement of



routines to take advantage of the floating-point arithmetic capabilities of the Altivec. All routines are callable from C and C++ compiled programs to achieve rapid and efficient program development.

The **Vector Signal and Image Processing Library (VSIPL)** is the result of a DARPA sponsored effort to define an open, industry standard API for vector, signal, and image processing primitives targeted at embedded real-time signal processing systems.

Implemented according to the "Core Lite" profile, VSIPL is a library of 125 functions for vector-based signal processing applications. The function calls are organized into four primary categories: support functions, basic scalar operations, basic vector operations and signal processing. Support functions facilitate object creation and interaction as well as memory management. The scalar and vector operations allow the programmer to perform numerical computation on dense rectangular arrays. Signal processing functions include FFT operations, filtering, correlation and convolution.

The object-oriented design of the VSIPL API employs the concept of blocks and views to provide a level of abstraction from the memory and processor architecture of the underlying machine. A block is a contiguous area of memory used for data storage. Views are a method for classifying the data as vectors or matrices. Blocks and views are created, accessed and destroyed via library functions. Manipulating blocks and views via library functions assists the application programmer in writing code that is truly portable and compatible.

## Fault Management

High availability features are implemented in all members of the product family to meet mission critical needs of scientific and commercial applications as well as the requirements of DoD applications. These features are specially designed to increase product availability, maintainability and to provide very fast recovery from component faults.

Each processing node has built-in self-test facilities to support instant start-up capabilities using local FLASH memory. This feature allows booting in a few seconds even on large scale systems.

Live insertion enables the replacement of failed processing modules without powering down the other nodes, local interconnect or the global network.

Protection from over temperature and over current conditions further enhance the ability of the StarGate product to deliver increased system availability.

## Environmental (Operating) Conditions\*

Environmental Parameters	Level I Commercial Industrial	Level II Extended Temperature	Level III Rugged air-cooled with stiffener ( 2924R )
Temperature Range	0°C to 40°C at 12 cfm	0°C to 55°C at 12 cfm	-10°C to 55°C at 12 cfm
Relative Humidity	up to 95%** (non condensing)	up to 95%** (non condensing)	up to 95%** (10 cycles @ 240 hours)
Maximum Altitude	10,000 feet***	10,000 feet***	10,000 feet***
Shock	15 Gs @ 11 ms half sine	15 Gs @ 11 ms half sine	20 Gs @ 11 ms half sine (MIL-STD-810F)
Vibration (random)	0.002 g <sup>2</sup> /Hz 10-2000 Hz	0.002 g <sup>2</sup> /Hz 10-2000 Hz	0.04 g <sup>2</sup> /Hz 10-2000 Hz (MIL-STD-810F)
Vibration (sinusoidal)	2 G's 5-500 Hz swept sine	2 G's 5-500 Hz swept sine	4 G's 5-500 Hz swept sine
Storage Temperature	-40°C to 85°C	-40°C to 85°C	-40°C to 85°C
* StarGate products are designed to meet these environmental conditions ** Conformal Coating is available as an option for relative humidity conditions with condensation. *** Ambient Temperature, Airflow and Altitude parameters can be traded off among each other. Consult Factory for more information.			

## Product Reliability

CSPI maintains its reputation as a leader in the development and manufacture of quality MultiComputers and signal processing equipment. Our products operate reliably in diverse environments such as truck-mounted systems in the Alaskan wilderness and the Saudi Arabian desert, and in mission critical aircraft carriers and submarine systems.

The high reliability of CSPI products results from dedicated work in six critical areas: ISO certification, adherence to standards, manufacturing procedures that meet the guidelines of IPC-A-600, testing to a wide range of environmental acceptance criteria, maintaining a life history database and performing operational burn-in.

## Warranty, Maintenance, & Customer Service

CSPI manufactured hardware products are covered by a return-to-factory warranty for one year from the date of shipment. If an item is found to be defective, it will be replaced or repaired. An optional extended warranty can be purchased to increase the warranty period to two years from the date of shipment. Out of warranty service is available on a time and materials cost basis.

CSPI software products are covered by a 90 day warranty from the date of shipment. Software support includes technical hot-line support, patches, bug fixes and version upgrades. An optional extended warranty can be purchased to increase the warranty period to one year from the date of shipment. Out of warranty service is available on a time and materials cost basis.

For more information on the warranty programs contact your local Sales Manager or call CSPI MultiComputer at **1-800-325-3100**.



**MultiComputer Division**

**(800) 325-3110 | www.CSPI.com | Email: info@cspi.com**

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